

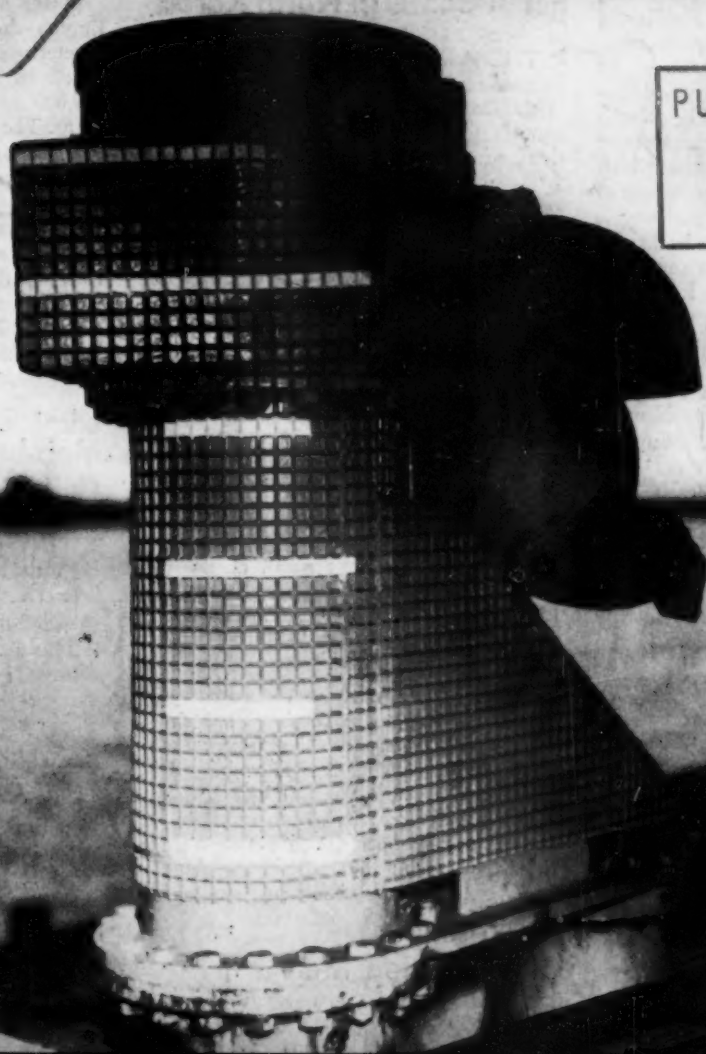
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TECHNOLOGY DEPT.

JULY 22, 1950

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



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Sea Breather

See Page 33

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## CHEMISTRY

# Competition for the Bee

► A DESERT shrub and the giant Douglas fir may soon be real competitors of the busy little bee in the wax-making business.

In a converted war alcohol plant at Springfield, Oreg., wax is already being extracted from the bark of Douglas fir. The operation is a milestone. Until this spring the bee had a complete monopoly on large-scale production of true wax in this country. Douglas fir bark was being burned as waste.

Chiefly responsible for the chemical process which made Douglas fir wax a reality is a research scientist at the Oregon Forest Products Laboratory, Dr. E. F. Kurth. Using home-made 50-gallon percolating tanks and household water heaters, he proved that the bark could be made to yield a true vegetable wax. The Kurth process is now being used by the Oregon Wood Chemical Co. at Springfield, which hopes to boost production to as much as eight tons of wax daily.

Douglas fir wax was found to be harder than beeswax but not so hard as carnauba, the hardest wax known. Ranging from light tan to deep red in a semi-refined state, it has the pleasant odor of balsam.

It is extracted from the bark by hot benzene. The solvent and wax are then pumped into a second tank where the benzene is distilled off by high-temperature steam.

Very similar to Douglas fir wax is the unusual oil of a little-known desert bush called *Simmondsia*. Potentially an extremely valuable new American crop, this plant has grown wild in Arizona, southern California and Mexico for centuries. Its nut-like seeds were used by Indians as food and a medicinal oil. The plant itself is nutritious fare for cattle, goats, sheep and deer.

In 1933 two chemists discovered that *Simmondsia* oil differs radically from all other known seed oils. It was more like sperm oil from whales. Chemically it was not a fatty oil at all, but a liquid wax.

Treated in the same way that modern shortening is made from cottonseed oil, *Simmondsia* oil becomes a very hard white wax, nearly as hard as carnauba. Untreated, it has qualities which give it great commercial promise. It does not become rancid as do ordinary vegetable oils. It can be used under high temperatures as a lubricant for high-speed machinery.

"Present market possibilities for *Simmondsia* oil would seem unlimited," N. T. Mirov, scientist at the California Forest and Range Experiment Station, writes in the journal *CHEMURGIC DIGEST*.

The oil can be used in the manufacture of rubber, chewing gum and linoleum, he says. The hydrogenated wax makes a good polishing wax, and can be used wherever wax is employed in modern industry.

The future of *Simmondsia* lies in taming it, the chemist points out. It is extremely difficult to collect the seeds from the wild bushes. But they can be cultivated successfully. A plantation of *Simmondsia* near Riverside, Calif., has flourished during the past six years, giving bigger seeds and more of them than do the bushes growing wild.

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## MILITARY SCIENCE

## No Worthwhile Target For A-Bomb in North Korea

► THE A-bomb almost certainly will not be used on North Korea. There is no target in the Communist-dominated territory large enough to warrant use of such an expensive and devastating weapon.

The "crude" A-bombs used at Hiroshima and Nagasaki obliterated areas of about 10 square miles. Largest city in North Korea is its capital, Pyongyang and, according to the South Korean Embassy in Washington, D. C., Pyongyang is a city of five square miles containing 600,000 people.

Second largest city in North Korea is Heamhung, up near the Russian border, with 300,000 inhabitants and four square miles of territory.

The next two largest cities, the Korean embassy spokesman says, are Haeju, on the western side of the peninsula near the 38th parallel, and Wonsan, a port city across the peninsula, also just north of the vital parallel. Both have between 100,000 and 125,000 populations and between three and four square miles of territory.

It is not necessary to devastate an entire city and scorch some of the surrounding countryside—as an A-bomb would do in any North Korean city—to render it useless militarily. Pyongyang and Heamhung both have been developed industrially and both are railroad centers. But old-fashioned bombs, used properly, could take care of the factories and the railroad yards.

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## GENERAL SCIENCE

## Eight Million Men Of Draft Age

► OVER 8,000,000 young men are in the age groups affected by the draft order issued recently.

According to latest Census Bureau estimates as of 1950 there are 8,189,000 males in the ages of 19 through 25. Those in the upper part of this age bracket number somewhat more than those of the earlier ages. That is because the death rate of such young men is insignificant as compared

with fluctuations in birth rate. The birth rate 19 years ago was lower than it was 25 years ago.

Here are the figures for each age: 19: 1,121,000; 20: 1,350,000; 21: 1,158,000; 22: 1,183,000; 23: 1,197,000; 24: 1,195,000; 25: 1,200,000.

A fairly large proportion of men drafted would be taken from their studies in school and college. In the age group 20 to 24, 827,000 are enrolled in school or college and of these 300,000 are not veterans. In the older age groups 25 to 29, a larger proportion of those in college are veterans since few men of that age are still in college unless their studies were interrupted by the last war. In this age group the enrollment is 23,000 non-veterans and 363,000 veterans.

In the age group 18 to 19 (the Census Bureau does not have estimates for the nineteen-year-olds alone) 593,000 are enrolled in school or college and of these 589,000 are non-veterans, only 4,000 veterans. These figures are as of October, 1949.

The drafting of men 19 to 25 will have a considerable effect on those employed in production, including professional and semi-professional workers.

A year ago there was a total of 6,525,000 men in the ages 19 to 25 and of these 2,376,000 were non-veterans. Of the non-veterans, 2.9% were professional or semi-professional workers.

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## BOTANY

## Membrane of Tiny Plant Cells Found to be Porous

► TINY plant cells are equipped with an even tinier network that carries materials between their nuclei and the surrounding cytoplasm.

This network might be compared to a railroad system which carries freight from a large city to and from the surrounding countryside.

Dr. Flora Murray Scott, professor of botany at the University of California at Los Angeles, reported the existence of the system to the International Botanical Congress in Stockholm.

Prior to her discovery, the membrane which encloses the nucleus was not known to be permeable. Scientists were puzzled over the manner of exchange between the nucleus and the cytoplasm. Her research is the first demonstration as to how the exchange may take place.

The plant cell network is made up of "fibrillae" or slender strands which traverse the membrane of the nucleus. In many plant cells, this network is barely visible under highest-powered microscopes.

In her research, however, the U.C.L.A. botanist used the giant nuclei of wild cucumbers, in which the strands are easily seen under the microscope.

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## ENTOMOLOGY

# Nerve Gases Vs. Insects

**The only defense against parathion is a gas mask. This insect killer belongs to a family of chemicals commonly known as the nerve gases.**

➤ WITH parathion, an insect killer now being used on U. S. fields and orchards, men on the big spray rigs have only two choices: Wear a gas mask or die.

There is good reason for the bold-face, urgent warning carried on each drum of this compound and of other new chemicals widely available to American farmers.

For while military authorities have kept "Top Secret" stamped across a weapon developed by Germany in World War II, that same weapon has been in use in this country for at least two years against insect pests. The weapon is a family of chemicals with an ominous nickname—the nerve gases.

Some of the effects of parathion on warm-blooded animals, and that includes man, were described recently by witnesses at a Food and Drug Administration hearing.

Now in their seventh month, the hearings are part of an extensive study by the Food and Drug Administration of crop control chemicals used on today's truck farms and orchards.

Since January, more than 5,000 pages of testimony and over 1,000 exhibits have been presented. All of the early testimony was limited to proving one already well-established premise: Chemicals are vital to modern farming; without them, fruit and vegetable growers would fight a losing battle.

The most important question, however—how toxic are these chemicals to man—is now being covered with testimony on such potent insecticides, weed killers, and fungicides as parathion.

Inhale too much parathion or absorb too much through your skin. In quick succession your muscles begin to twitch, you find it hard to breathe, your nose and mouth begin to water. Then come gasping, diarrhea, convulsions, unconsciousness and death.

This has happened to more than a dozen farm workers and chemical packers in the last two years, Dr. John P. Frawley of the Food and Drug Administration told Science Service. Seven men died last year from parathion poisoning. Several have already died this farming season.

Even more toxic than parathion are two other insecticides still to be taken up in the protracted Federal hearings on allowable residues of chemicals used on U. S. fruits and vegetables. These are TEPP and HETP, or in full chemical designation, tetraethyl pyrophosphate and hexaethyl tetraphosphate.

Gas masks are essential in handling

these chemicals, members of a deadly family called the organic phosphates. Rubber gloves, boots, hat and raincoat are advised, for the poisons can be absorbed easily through the skin.

Why use these dangerous substances at all? Because they are among the most effective insecticides yet developed. Fruits and vegetables on which parathion can be used to cut down insect losses include apples, pears, plums, peaches, beans, beets, cabbage, carrots, corn, onions, peas, potatoes and tomatoes.

Parathion kills mites, moths, aphids, the Mexican bean beetle, armyworm, corn borer, corn earworm, thrips, Colorado potato beetle, red spider, grasshoppers and the Japanese beetle.

## MEDICINE

## Mechanical Kidney

➤ MODERN machines that save lives instead of destroying them are the mechanical, or artificial, kidneys now being made in several styles. The artificial kidney takes over when the patient's own kidneys stop functioning temporarily.

When the kidneys are not functioning, waste products—especially those containing nitrogen—get into the blood and cause poisoning. This condition is known as uremia.

Back in 1914, three American scientists



**STAND-IN FOR KIDNEY**—Blood from the patient's arm runs through the cellophane tubing wound around the drum. Used by patients suffering from uremia and pregnancy complications, it also helps those less acutely ill.

Only in extremely heavy doses would parathion residue on fruits and vegetables reaching market prove dangerous to consumers, experts from the Food and Drug Administration and industrial laboratories testified at the legal tolerance hearings.

Dr. Frawley said long-term Government experiments showed that two-tenths of a milligram of parathion per thousand grams of a rat's body weight produced no ill effects. In man, he said, one-fourth of that amount or about 3.5 milligrams for a 150-pound human being would be well within all safety limits.

Dr. Clinton H. Thienes, head of the department of pharmacology at the University of Southern California School of Medicine, had a higher estimate. Man can take 50 milligrams (about 2/1000 of an ounce) of parathion in a day without suffering any adverse effects, he said.

Object of the Food and Drug Administration hearings is to round up such basic data as this for a new set of Federal regulations. The regulations will set the permissible amount of chemical residue on fruits and vegetables to be sold in interstate commerce.

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had the idea that if the blood could be dialyzed through a fine-pored membrane which would sieve out the waste products, it could then be returned to the body and the patient might survive. They tried this on animals, but had difficulty in keeping the blood from clotting while it was out of the body.

Discovery and development of heparin as an effective anti-blood clotting agent and of cellophane membranes, made possible the construction of practical artificial kidneys for human use.

Blood from the patient's arm is run through cellophane tubing wound around a big drum. The drum revolves in a bath of special salt solution. After its bath, the blood is returned to the patient's body through another vein.

At the same time that the impurities are being removed from the blood, beneficial chemicals can be put into it from the fluid in the bath, the chemicals being selected in accordance with the particular patient's needs. Heparin keeps the blood from clotting and the temperature can be kept the same as that of the body.

Dr. W. J. Kolff pioneered the development of this type of artificial kidney during the war at the Municipal Hospital at Kampen, Holland. After the war he came to this country and is now a staff member of the Cleveland Clinic, Cleveland, Ohio.

The artificial kidney shown in the picture is a Kolff type, but other styles have been devised. One of these uses flat cellophane sheets between longitudinally corrugated plates.

Patients with acute uremia in kidney disease, in the pregnancy complication, eclampsia, in shock conditions and in some types of poisoning, may be saved by the artificial kidney which keeps them alive while their own kidneys are recovering from the acute condition.

But other, less acutely ill patients may

also be helped by this machine. And the apparatus may prove important for research leading to new knowledge of body processes.

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#### ASTRONOMY

### Unseen Distant Galaxy May Prove Relativity Theory

► A SLIGHTLY fuzzy object surrounded by an almost-perfect halo has been discovered in the constellation Serpens by Arthur Hoag, of Harvard College Observatory.

He proposed to the American Astronomical Society in Bloomington, Ind., that in lieu of other explanation it may be a "gravitational lens," caused by the curvature of space around the large total mass of a galaxy of stars.

According to Einstein's theory of relativity, light will be deviated in the vicinity of massive bodies, and at eclipses of the sun it has been found that such deviation is observable in the light of stars passing near the sun. If a very distant galaxy of millions of stars happens to lie exactly along the line of our sight to an even more distant similar galaxy, the gravitational action of the first galaxy could conceivably cause the light of the second to be curved around it on all sides. Thus, although we could not see the one galaxy behind the other, its light would reach us as a "halo" around the nearer object.

The new object, found on a Schmidt camera photograph of 75 minutes exposure at Harvard Observatory, is of the 17th magnitude, and it has an almost perfect halo around it, 17 seconds of arc in radius. At first, this might appear to be one of the so-called planetary nebulae, which are rings of gas surrounding hot blue stars. The color of the nucleus of the new object is red, however, and the spectrum of the

halo is continuous, not consisting of bright emission lines as it would if it were a planetary nebula.

The object is far from the plane of the Milky Way, where no planetaries have been observed, but where galaxies abound. Its nucleus is fuzzy, not starlike, and its appearance without the halo would cause it to be classified as a galaxy of the spheroidal type, with a total mass equal to that of 800 thousand million suns.

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What animal fasts for posterity? p. 62.

Photographs: Cover, Department of Defense; p. 53, Hamilton-Wright; p. 55, New York Zoological Society.

## GENERAL SCIENCE

# USSR Subs Threaten Korea

Russia may have up to 100 submarines in her Far Eastern bases. The submarine now has a decided advantage over any known method against it.

See Front Cover

► DEADLY, modern Russian submarines, operating from bases in Siberia and possibly Red China, are an ominous threat to our forces in Korea. At the end of World War II, the pendulum swung once more, giving the submarine a decided advantage over methods of defense against it.

Allied forces in World War II, through intensive application of science and great effort, were able finally to control the Nazi subs. But the late-in-the-war development by Germany of the snorkel breathing device, the long range torpedo and subs which could move faster underwater than the majority of their prey, have once more swung the balance so that the situation for transports and surface naval units in and around Korea is serious. Russia grabbed off many models of these modern subs and took into custody many German submarine engineers at the end of the war.

As Dr. Vannevar Bush, who directed our scientific effort in World War II, put it in a recent book: "If we entered a war soon, against a technically and industrially strong enemy, and if that enemy could effectively apply modern devices at sea, we should have the whole job of overcoming the submarine to do over again on a new and unattractive basis."

"Again we should face the severe threat that a nearly immune submarine fleet might determine the outcome of the war in favor of the enemy. Many of the successful methods of the last war are now obsolete against the truly modern submarine. There is no cure-all."

Russia may have anywhere up to 100 submarines in her Far East bases, many of them now equipped with snorkels and the latest type of speedy underwater engines.

The modern submarine's snorkel is the device that supplies fresh air to engines and crew, thus enabling submarines to remain submerged for almost indefinite periods. The snorkel's nose is shown on this week's cover of SCIENCE NEWS LETTER. Only top-most part of snorkel projects above the water.

Just as Russia has given the North Koreans tanks and planes, so she could turn over to the North Korean "navy" her Far Eastern submarine fleet. As United Nations troops and materiel are built up in South Korea, it would become a greater temptation to Russia to try to cut our sea supply lanes with submarines.

There are all sorts of gadgets for use in defense against submarines. Sonar sends out high frequency sound waves which come back as echoes when bounced off a sub. Sono-buoys work on the same principle and can be strewn over wide areas to give anti-sub ships and planes warning of the whereabouts of enemy undersea craft.

But sonar is relatively useless against a modern sub equipped with torpedoes with a range greater than sonar's range. And sono-buoys cannot cover the immensely greater areas over which a snorkel-equipped sub can roam today.

The best defense against submarines is to attack their bases. Russia has a large naval base at Petropavlovsk, on Kamchatka pen-

insula, facing the open Pacific to the north of Japan. Another base is at Vladivostok, only a few miles from the North Korean border. And there are other bases on the mainland coasts of the Seas of Japan and Okhotsk.

But this method of defense is barred so long as we are not at war with Russia and if the submarines are dubbed "North Korean."

Since the end of the war, when we realized that the submarine once again had the potential advantage, scientists and naval experts have been working hard to overcome that advantage. But peacetime progress has been relatively slow and hampered by interservice and intraservice arguments.

The war against the submarine today is more than ever a war of science, of developing new devices which will hunt out the lurking sub, new weapons and explosives which will hit and penetrate the attacking sub. Whether that war has yet been won, on paper, of course we do not know. Knowledge of the post-war development of the Russian submarine service and a glance at United States naval budgets make it reasonably certain the battle has not been won in terms of ships afloat and weapons at hand.

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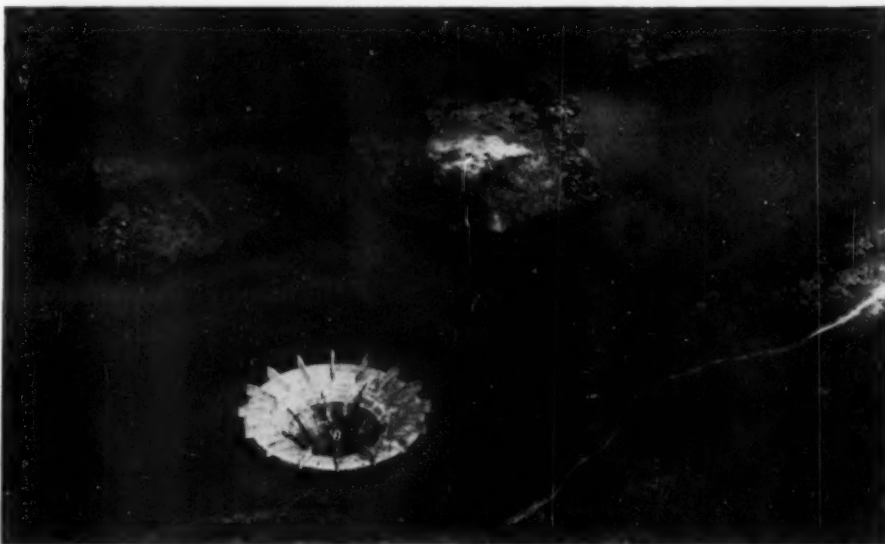
## CONSERVATION

## Puerto Rico Waters Land

► PUERTO RICO, Uncle Sam's Caribbean outpost, is stretching its coastline by piping water through mountains. In a \$24,000,000 project to be launched soon, the island hopes to add 35% more acreage to its irrigated lands available for agriculture.

Five reservoirs and two hydro-electric

stations will be part of a system to bring water to the wide, arid Lajas Valley in southwestern Puerto Rico. The system will utilize heavy rainfall on the northern side of the mountains, bringing the water through eight miles of tunnels into a network of irrigation canals serving 25,000 to



**IRRIGATE, RECLAIM, EXPAND**—A \$24,000,000 hydro-electric, irrigation and water supply project in the southwestern part of Puerto Rico will soon be launched. This is part of Puerto Rico's agricultural and industrial "comeback."

30,000 acres.

On the southern side of the mountain divide the power stations will tap flow between reservoirs to provide electricity for industrial expansion on the island.

Puerto Rico began its program of power development in 1940 to attract industry from the United States and boost employment of its own people. The huge Caonillas Dam was completed in 1948, bringing to 18 the total of the island's hydro-electric plants. These plants supply nearly all the island's power.

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#### AGRICULTURE

### Vanilla May Soon Come From Cultivated Plants

► THE flavoring for vanilla ice cream may soon be coming from cultivated hybrid vanilla plants from American soil in Puerto Rico instead of from wild plants in Mexico.

The first hybrid seedlings of a vanilla plant which may resist a root-rot prevalent in Puerto Rico have been produced by Dr. Lewis Knudson, head of the Department of Botany at Cornell University, in Ithaca. Dr. Knudson worked with seeds produced at the Federal Experiment Station in Puerto Rico which wishes to establish a vanilla industry to aid the territory's economy.

The vanilla plant is an orchid. No one was able to produce the plant from seeds until the 1930's. No hybrid seedlings had ever been produced. Starting in 1938, Dr. Knudson had to work out a method of germinating the seeds for himself. No hybrid plant could have been produced without discovering a workable method of germinating the hybrid seeds.

After many years of experiments, Dr. Knudson discovered that vanilla seeds would not germinate with the use of methods for germinating other orchid seeds. He found that, in addition to keeping the seeds in the proper nutrient, they had to be maintained at higher temperatures than usual for a longer period of incubation.

Once Dr. Knudson developed his method of germination, he tried it on seeds of hybrid plants produced at the Federal Experiment Station in Puerto Rico. Four years later he succeeded in producing seedlings from hybrid seeds. This was the first time hybrid seedlings of the vanilla plant had been produced.

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#### ANATOMY-PHYSICS

### Must Understand Ear to Know Why Hearing Is Lost

► IS THE human ear a microphone for the brain, sending nerve messages of all it hears to the brain? Or does the ear pick out the different sounds like a piano operating in reverse, telegraphing to the brain when each key is sounded?

Questions such as these are very impor-

tant for understanding the reason for hearing loss, report Dr. Hallowell Davis, Dr. S. R. Silverman and D. R. McAuliff of the Central Institute for the Deaf, St. Louis. Experiments showing that the ear-brain team operates on the telegraphic system rather than the microphone system were discussed by them at the meeting of the Acoustical Society of America in State College, Pa.

A high-pitched squeak was made shorter and shorter by electronic means until the sound wave made just a few wiggles from the beginning to the end of the squeak. It then sounded like a metallic click. When the short squeaks were sent out one after the other at the same rate as the vibrations corresponding to low C on the musical scale, listeners said they heard a "buzz," or "rough metallic sound."

No listener, even when encouraged, was able to hear a low C, in spite of the fact that each click was sending a nerve message to the brain and doing so at a rate corresponding to low C.

The experimenters interpret this to mean that the brain cannot use the ear as a microphone. Instead the ear seems to separate out the different tones, and each tone is signalled separately to the brain. This explains how the sound was heard like just a lot of high pitched squeaks, making rough metallic sounds, not a low-pitched hum.

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#### ICHTHYOLOGY

### Plankton, Fish Food, May Become Human Food

► PLANKTON, food of the fishes of the sea and a possible future substitute for human food, will be studied from a research ship in the Caribbean-Gulf of Mexico area, it was announced in Washington.

The research, sponsored jointly by the University of Miami and the National Geographic Society, will include regular seining of the area and simultaneous observations of water and light conditions, temperatures and other factors.

Plankton are minute organisms, in both plant and animal form, which drift with the currents. The animal form, zooplankton, feeds on the plant form or phytoplankton. Sea life, from the smallest fish to species of whales, depends on these organisms for food.

The project will be headed by Dr. F. G. Walton Smith, director of the Marine Laboratory at the University of Miami. Associate director will be Dr. Hilary B. Moore, also of the University of Miami.

The scientists will try to find out how masses of plankton materialize, their relationship to fish life and their possible relationship to climate changes.

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**IT'S A BATHYTHERMOGRAPH!**—This mechanism will help to disclose some of the secrets of the ocean's drifting "meadows," populated by minute marine creatures known as plankton. Everett C. Jones, one of the research team, is shown adjusting the educated gadget, which measures ocean depth and temperature.



## ENGINEERING

# From Now On: Fuels

Dwindling petroleum resources necessitate development of synthetic fuels. Hydrogen from water may provide the raw material for a truly synthetic liquid fuel.

By WATSON DAVIS

*Seventeenth in a series of glances forward in science.*

► MODERN life with its automobiles, oil heat, Diesel engines and airplanes is so tied to petroleum that it is little wonder that there is a scare now and then that the earth will not be able to give forth the increasing flow of needed oil.

Actually there is little danger that the world's oil wells will not stand the strain for the next few decades, although oil from shale, synthetic petroleum from coal and even motor fuel from farm crops may come in gradually in locations where the natural oil is remote, scarce, or more costly.

The proved petroleum reserves are now larger than they were a few years ago. Proved and measured by drilling there are over 28 billion barrels of petroleum and natural gas liquids. You can not measure how long these will last by dividing this figure by the approximately two billion barrels produced annually.

For there is an excellent chance that geologists and drillers will continue to bring in new fields in unproved areas just as they have in western Texas and beneath the waters of the Gulf of Mexico in the past few years.

Even if there were no more discoveries it would take far more than 15 years to use the known reserves. The rocks underground can not be forced to accelerate their petroleum yields. There would be a gradual decline, not a sudden oil famine.

Great chemical industries are being based on the future flow of oil, such petroleum is a versatile raw material. Natural gas is more plentiful than previously imagined and it, too, can be changed into many products, including liquid fuels.

As a hedge for our future, whether it be jet-propelled or internally combusted, there is always oil shale and coal. As the Germans were forced to demonstrate by their oil shortages and as government research is confirming and improving, there is oil to be extracted from the shale rocks and synthesized from coal. In Colorado alone there are known deposits of oil shale capable of yielding 300 billion barrels of oil, over ten times the proved oil reserves.

There is almost fabulous fuel for our future, with costs, time and capital investments providing the main question marks.

For years to come, we may expect:

A. Increasing costs, longer hauls, deeper drilling and greater chemical appreciation of our natural petroleum and natural gas,

with overseas lush fields giving us a larger share of their production.

B. The beginnings of practical production of liquid fuels from oil shale, even in competition with oil from the ground.

C. The possibility that if solar energy can be captured on a large scale by "synthetic" photo-synthesis, hydrogen from water can be produced sufficiently cheaply to provide the raw material for truly synthetic liquid fuel and a whole array of chemicals.

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## ENGINEERING

## Bad TV Installations Are Fire-Lightning Hazards

► TELEVISION installations, unless precautions are taken, may be both a fire and a lightning hazard, the National Board of Fire Underwriters warns in a bulletin just issued. Installation suggestions are included.

High television antennas increase the possibility of damage by lightning and high winds, the bulletin states. It recommends use of approved lightning arresters. If the antenna is mounted on a metal pole or tower, pole or tower should be grounded.

Television receivers consume more current than ordinary radios, a higher voltage is used and the instruments have a greater number of heat-producing parts. They are therefore a greater fire hazard. Proper ventilation makes the danger minor. Particular care should be taken by users to see that the natural ventilation built into the receiver is not obstructed or reduced by location or blanketing.

Science News Letter, July 22, 1950

## INVENTION

## Carrier Safely Handles Radioactive Materials

► RADIOACTIVE materials will present no danger to handlers and others while enroute from U.S. Atomic Energy laboratories to research institutions if shipped in a carrier which was awarded a patent by the government.

Such carriers must be made of lead or other suitable shielding material. In this carrier the lead is encased in steel to give added strength. Its particular feature is the design which permits holding a number of radioactive slugs.

The inner part is a cylinder that can be revolved. In the cylinder are bores to hold the slugs. Each bore can be rotated under

a single opening. This assures ease and safety in loading and unloading.

Patent 2,514,909 was awarded to Gerald Strickland, Medford, N.Y., for this carrier. Rights are assigned to the U.S. Atomic Energy Commission.

Science News Letter, July 22, 1950

## METEOROLOGY

## Thunderstorms No Menace to Planes

► THUNDERSTORMS can be passed through without undue difficulty using proper aircraft and flying techniques, the Institute of the Aeronautical Sciences was told in Los Angeles by L. C. Kappil of Wright-Patterson Air Force Base, Dayton, Ohio.

He reported on "Project Thunderstorm" which originated in 1945. Field work was carried out first in Florida, where subtropical thunderstorms are encountered. Later work was done in Ohio, where frontal and prefrontal storms are found. Hundreds of flights were made through storms.

Participating agencies were the U.S. Air Force, Navy, U.S. Weather Bureau and the National Advisory Committee for Aeronautics.

Science News Letter, July 22, 1950



**FORMULA FOR COOLNESS—**  
Looking smug about his ideas of beating the heat, the electric eel comes to the surface of the water to take a gulp of air. Since it breathes atmospheric air, the electric eel must have access to the surface two or three times a minute; eels have been drowned when they were accidentally submerged for only ten minutes. They can, however, withstand periods of 72 hours out of water, so long as their mouths are kept moist.

## AERONAUTICS

**New Techniques Aid Sea Rescue Work**

► RESCUE work at sea, with the use of flying boats, is aided by techniques developed by Comdr. Donald Bertram MacDiarmid of the U. S. Coast Guard. For his work, he was given the Octave Chanute Award in Los Angeles recently at the annual dinner of the Institute of the Aeronautical Sciences.

In order to extend the effectiveness of air rescue work at sea, Comdr. MacDiarmid made innumerable landings of a flying boat under very severe conditions. Some of these landings were made in seas as high as 18 feet and in winds up to 23 knots. He developed methods that permit flying boats to operate in seas too rough for small surface craft.

A three-camera system for low-altitude night photography brought Col. George W. Goddard of the Wright-Patterson Air Force Base, Dayton, Ohio, the Thurman H. Bane award of the Institute of the Aeronautical Sciences at the same meeting.

The three-camera system developed by him gives a vertical and two oblique pictures with moving film synchronization to compensate for ground image motion. Illumination comes from an ejected photo-flash cartridge which, by bursting at 600 feet behind and 400 feet below the photographic plane, reduces the danger of the ship's illuminating itself as an enemy target.

In a test of the system while under development, made about a year ago over New York City, a series of cartridges, each developing 50,000,000 candlepower, were ejected at intervals from a B-17 flying over the city at approximately 1,800 feet. Despite ground haze and smog, the resulting pictures compared favorably with daylight photography.

Science News Letter, July 22, 1950

## ENTOMOLOGY

**Mexican Fly May Restore Hawaiian Grazing Land**

► A TINY Mexican fly, measuring less than a quarter of an inch with wings spread, gives promise of restoring thousands of acres of Hawaiian cattle land to useful production.

The insect, known as the stem gall fly, was brought to Hawaii in 1945 by Noel L. H. Krauss, a Territorial Board of Agriculture entomologist, as a possible means of combatting pamakani, a shrub pest which chokes large cattle raising areas in the Islands.

Before introducing the fly to Hawaii, Mr. Krauss conducted extensive tests in Mexico, where this shrub pest also flourishes, to find out whether the gall fly and other parasites which attack the shrub might also attack beneficial plants. This was deter-

mined by depriving the insects of their pamakani diet. The gall fly was deemed safe.

Propagated in the Board's laboratories, the fly was released on the islands of Maui and Oahu.

It became quickly established, but at first seemed to do little good. Then suddenly, the pamakani began to turn brown and die. Examination showed the fly planted its eggs in the stem of the shrub, from which worms developed. In an effort to defend itself, the plant built a "gall" around the worm. Most growths stopped just beyond the gall. If growth did continue, it was found the upper stem was greatly weakened and rotted.

C. E. Pemberton, Hawaiian Sugar Planters' Association entomologist, described it as "the fastest piece of plant pest control" in the Territory's long fight against such pests.

Mr. Pemberton said that before the gall fly arrived the pamakani was so thick on one Maui ranch that "it was impossible to ride through it on horseback or for cattle to get through."

"Now, there is not one pamakani plant on the whole 65,000-acre ranch that has not been affected, as far as we can determine," he said. Large areas hitherto blocked are now passable.

Much of the area is now being seeded with grass for grazing.

"If the fly continues to decimate the pamakani as in the past year, many thousands of acres will be reclaimed," Mr. Pemberton said.

The fly has now succeeded by its own efforts in crossing to the island of Lanai and is going to work on the pamakani there.

Science News Letter, July 22, 1950

## NUTRITION

**Even Rats Starve on Diet Of India's Hungry Poor**

► AMERICAN rats soon show signs of starvation when fed on the same rice diet that is the main food of South India's hungry poor.

Trying to develop practical ways for improving the diet deficiencies of India's poor, Mrs. Rajammal P. Devadas of that country, working at Ohio State University, fed white albino rats rice diets with various supplements added. She reported to the American Home Economics Association meeting in Boston the differences in the rats' growth, food consumption and liver vitamin A when fed the various diets.

Her study showed that rice diet is mainly lacking in vitamin A, riboflavin and as yet unidentified factors present in egg yolk. Rats fed the basic rice diet grew poorly, consumed small amounts of food and developed hunched postures and roughened coats.

Science News Letter, July 22, 1950

**IN SCIENCE**

## ENTOMOLOGY

**Fly's Wings Beat 212 Strokes Per Second**

► A FAST fellow on the take-off is the housefly. Just how fast a fly can move when startled has been uncovered by a ballistics expert using a high-speed camera.

At the Army Chemical Center in Edgewood, Md., an unsuspecting fly landed on a target plate used in ballistics tests. Thereupon, Carl M. Herget reports in the journal SCIENCE (July 14), he fired a shot. The plate was jerked from under the fly's feet, leaving the fly out in mid-air. A camera capable of taking 2,400 pictures per second told the rest.

The fly fell about an eighth of an inch. Then, only 21 thousandths of a second after the bullet struck, its wings went into action. The target plate rebounded, turning the fly upside down, and strong air currents buffeted the tiny aviator. But through it all, the fly's wings continued beating at some 212 strokes per second.

Science News Letter, July 22, 1950

## GENERAL SCIENCE

**Scheduled "Wrecks" For Greater Safety**

► "SCHEDULED" collisions by automobile stunt drivers are helping science to understand "unscheduled" collisions on the highway.

Herman P. Roth, physiologist of the University of California at Los Angeles' Institute of Transportation and Traffic Engineering is working with the Joie Chitwood "Daredevils" in the research.

From their experiments may come information that may be used by automobile manufacturers in providing greater safety features in passenger cars of the future.

High speed motion picture cameras and other instruments are used to record forces involved in collisions between speeding automobiles.

While the Chitwood stunt drivers are thrilling the crowds by deliberately crashing cars head-on and diving them into other vehicles, the U.C.L.A. scientists are gathering valuable information on how much of an impact a human body might be subjected to in such a collision.

"Highway collisions do not happen conveniently so that researchers can have competent observers with instruments on hand to record pertinent data," Mr. Roth points out. "This is why the study of crashes by stunt men is valuable. Their performances are the only head-on collisions scheduled in advance."

Science News Letter, July 22, 1950



# SCIENCE FIELDS

## BOTANY-MEDICINE

### Cancer in Plants May Be Key to Human Cancer

► **CANCER** in plants may some day give science the key to human cancer. For fundamental work on diseased growth, plants can be studied in large numbers while growing in rigidly controlled chemical gardens.

Plant cancers seem to be started by physical or chemical factors which act as trigger mechanisms. After the trigger is pulled, what happens depends upon the gun and the way the gun is loaded, the International Botanical Congress heard in a paper written by Drs. A. J. Riker and A. C. Hildebrandt, plant pathologists at the University of Wisconsin.

Some 100,000 separate pieces of plant tissue were studied by the two scientists. They found that the basic substances which give plants their nutrition from the soil can both speed up and slow down diseased growth, depending upon the amounts of various nutrients present.

"For normal growth, a number of factors seem to operate in a suitable balance," Drs. Riker and Hildebrandt reported. "For diseased growth, these factors may be out of balance in one way or another."

When the trigger of cancer is pulled, in more vivid terms, the gun may have a high-powered load, a normal charge, or the powder may be wet.

Object of the Wisconsin studies, supported by the American Cancer Society, the Donner Foundation and the Wisconsin Alumni Research Foundation, is to find a way in which the powder keg of human cancer may perhaps be given a good wetting down.

Science News Letter, July 22, 1950

## INVENTION

### Better Coat, Paint Saved In Hot-Spray Process

► **PAINT** near the temperature of steam is applied by spray in a new "hot spray" process for which the necessary heating equipment has now been developed. Varnish and lacquer can be applied by the same method.

In the process, heat replaces a large part of the solvents now used in paint. This means that a higher percentage of solid material and pigment is applied, and surfaces are better covered with the lasting materials. Drying time is also decreased due largely to the decreased quantities of solvents used.

Flow characteristics of the heated paint are better than in cold paint spraying. What

painters call sags, runs and peels are eliminated. The "hot spray" process means a reduction in the amount of paint required, and also in the amount of "thinner" and work needed. Lower pressure is required. This results in a saving because fewer particles of the paint are wasted by being blown away from the surface being covered.

Hot spraying equipment developed by Bede Products, Inc., sucks paint, varnish or lacquer from the original containers through the heating chambers and keeps the heated material in a constant circulation between the heater and spray gun by means of a double hose. This cuts cooling losses in the gun connection and assures a high-temperature delivery.

Science News Letter, July 22, 1950

## MEDICINE

### Terramycin Stops Kidney Infections

► **TERRAMYCIN**, one of the newest antibiotics, is succeeding in the treatment of kidney and bladder infections where other antibiotics and sulfa drugs have failed.

In a seven-day course of treatment to a group of 24 patients at University Hospital in Ann Arbor, Mich., the new drug cured six and temporarily improved 14 others. Four cases showed no response, Drs. Reed M. Nesbit, John Adcock, William Baum and Cora Owens report.

All the patients had been previously treated with penicillin, sulfa drugs and other antibiotics. Although terramycin effected a cure in only 25% of the cases, the fault lies with the body tissue and not the drug, the doctors indicate. The tissue's ability to fight infection is impeded by chronic inflammation, they declared.

Science News Letter, July 22, 1950

## PHYSICS

### Large-Scale Development Nuclear Power Not Imminent

► **LARGE-SCALE** development of nuclear power is unlikely before ten years, the World Power Conference was told in London.

Sir John Cockcroft, director of Britain's Atomic Energy Research Establishment, outlined the problems to be solved in putting atoms to work for humanity. Many of these problems were stressed by Dr. Ward F. Davidson of Consolidated Edison Company of New York, who stated that the technical problems to be solved are proving more difficult than was expected.

Dr. L. Kowarski, scientific director of France's Atomic Energy Commission, reported on the progress of nuclear developments in that country. He said that the possibilities of further atomic progress in France on a widened basis would be largely dependent on the world situation two or three years hence.

Science News Letter, July 22, 1950

## PHYSICS

### Evidence for Duplex Neutron Discovered

► **EVIDENCE** for the existence of a duplex neutron, called the "dineutron," which is a momentary merging of two of the atomic particles that trigger the A-bomb, has been obtained at the Los Alamos Laboratory of the Atomic Energy Commission.

The existence of the dineutron appeared demonstrated during investigation of the bombardment of tritium by tritium, a reaction of great interest because it has been suggested as one of those involved in the so-called hydrogen bomb. Tritium is the radioactive triple weight variety of hydrogen, unknown in nature but made in atomic reactors.

Researches with tritium were reported by Dr. A. Hemmendinger of Los Alamos to a physics meeting held under the auspices of the Oak Ridge National Laboratory. A result of the tritium-tritium reaction was that two neutrons given off were coupled together as a composite particle for a short time.

Science News Letter, July 22, 1950

## GENERAL SCIENCE

### USSR-US Seed Relations Follow Golden Rule

► **IF** the United States deliberately tried to infect Russia with insects, weeds and plant diseases through Lend-Lease shipments during World War II, then it was trying to spread havoc on its own farms as well.

The same inspection was given seed shipments to Russia as was made on seed for our own use, officials of the Department of Agriculture revealed.

A Russian magazine charged recently that Lend-Lease food and seeds were infected artificially to sabotage Soviet crops.

Of course there were seeds of noxious weeds mixed with shipments of food seeds, U. S. experts said. It is humanly impossible—without going through millions of tons of tiny seeds one by one—to certify that a load of seed is 100% pure. But U.S. seed inspection does certify that a given shipment is perhaps 99% pure—and we did that for the Russians.

"Those fellows came in here with a list of plant diseases, weeds and insects which included everything under the sun," said one exasperated expert.

"We told them we wouldn't even consider the list," he said. "We further told them, however, that no seeds would be sent over which would not pass inspection for our own use."

"The Russians never said they would accept the seed on that basis," the official continued—"but they certainly accepted it as fast as we sent it."

Science News Letter, July 22, 1950

## ASTRONOMY

# Jupiter Comes into View

Mars and Saturn are disappearing from view, but Jupiter will be visible for about three months. Jupiter, the giant planet, is the only one that can boast 11 moons.

By JAMES STOKLEY

► **ALTHOUGH** three planets may be seen these August evenings, two of them are about to disappear from view for a while. The third, however, is just coming into sight and will be with us for the next few months.

This is Jupiter, largest of the planets, which is shown on the accompanying maps in the southeast in the constellation of Aquarius, the water carrier. These maps give the appearance of the heavens at about 10:00 p.m. at the beginning of the month, an hour earlier around the fifteenth and about 8:00 p.m. at the end. (Add one hour if you are on daylight time.)

The other two evening planets are Mars and Saturn which have been visible during the spring and early summer. Saturn is in the constellation of Leo, the lion. At the first of August it sets about an hour and three-quarters after the sun. Thus it is not shown on our maps, because it is below the horizon by the times for which they are made.

Mars is farther east in Virgo, the virgin, part of which is shown on the southern map toward the west. Thus Mars barely appears on the map. And it is so low that absorption by the greater thickness of atmosphere its light has to penetrate reduces the brightness considerably below first magnitude.

## Jupiter Very Bright

Jupiter's magnitude just now is minus 2.4, brilliant enough to make it most conspicuous even though it, too, is somewhat dimmed by its relatively low altitude. It is about ten times the brightness of the most brilliant star now seen. This is Vega, in Lyra, the lyre. Vega is shown on the map of the southern skies almost directly overhead.

Our second brightest star on August evenings is Arcturus, which is about 90% of the brilliance of Vega. Arcturus is in the constellation of Bootes, the bear-driver, high in the west. A good way to locate it is to start with the great dipper which is part of Ursa Major, the great bear, in the northwest. In the lower part of the dipper are the pointers which show the direction of Polaris, the pole star. The curve of the handle, if followed, brings you to Arcturus.

Immediately below Lyra toward the east is the figure of Cygnus, the swan, in which there shines the first magnitude star Deneb.

Part of Cygnus is shown on the map of the southern half of the sky and part on the northern. Deneb can be found in the northern section.

Just south of Cygnus are two interesting small constellations. These are Delphinus, the dolphin, and Sagitta, the arrow. South of them we come to Aquila, the eagle, with still another bright star, called Altair.

Fifth of the first magnitude stars now to be seen is low in the south in the constellation of Scorpius, the scorpion. The star is Antares, a name which means "rival of Mars," given on account of its red color which makes it resemble that planet. It is supposed to mark the heart of the scorpion, whose tail curls down and then up again in the south.

## "Shooting Stars"

About Aug. 12 we will have an excellent opportunity to see meteors, or "shooting stars," belonging to the Perseid shower. They are so called because they seem to radiate from the constellation of Perseus, the champion, which rises in the northeast about midnight. With a dark and clear sky it is usually possible on any night to see two or three meteors every hour before midnight, and more in the early morning. However during the night of Aug. 11-12, the numbers seen may rise to one per minute.

At this time of year we meet a swarm of these particles, most of them no larger than a pinhead, and the frictional heat generated when they hit the atmosphere causes them to burn up in a flash of light. Actually they are moving through space

in parallel paths, although they seem to converge in the distance, like the tracks of a railroad. That is why they appear to radiate from the point in Perseus. Since the moon will be new on Aug. 13, it will be out of the sky when these meteors are most numerous and its glare will not interfere with our seeing them as it sometimes does.

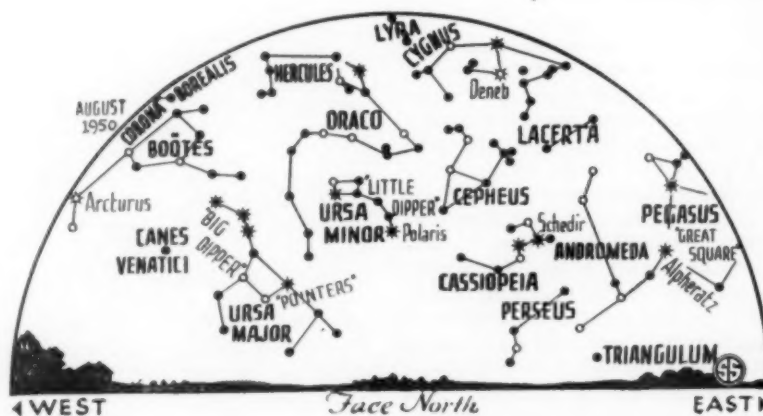
In addition to the three planets of the evening sky, another can now be seen in the early morning hours. This is Venus which is in the constellation of Cancer, the crab, and rises in the east about two hours before sunrise. It is even more brilliant than Jupiter. Mercury this month is too close to the sun to be seen.

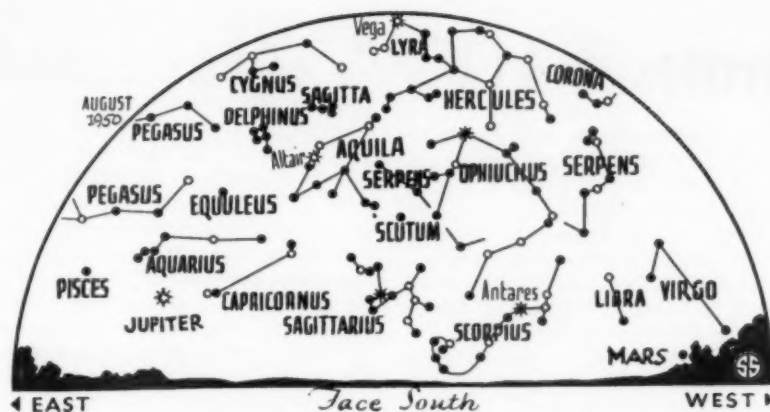
## Jupiter and Earth Differ

Knowing that the earth is one of the planets that, with the sun around which they revolve, form the principal parts of the solar system, we are sometimes inclined to think of our globe as typical, and to assume that the others are more or less the same. However, Jupiter, which has now come into the evening sky, is very different from the earth. For one thing, the fact that it has 11 moons, some of them bigger than our lone satellite, is a mark of distinction. This is a larger number than for any other planet.

The globe of Jupiter differs considerably from earth. Whereas our diameter is about 7,900 miles, that of Jupiter is about 11 times as much, or 87,000 miles. This is a mean value, since it is nearly 6,000 miles less, measured from pole to pole, as it is across the equator of the planet. Looking at Jupiter, even through a medium-sized telescope, the elliptical shape is easily apparent.

The reason for this bulge at the equator is found in the rapid rotation of the planet, which takes place in a little less than 10 hours, causing considerable centrifugal force. This whirls the equatorial material several thousand miles farther from the center than at the poles, which is not subjected to such forces.





★ ★ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

From the way that Jupiter pulls on the tiny planets called asteroids, as well as on its satellites, it is possible to determine its mass with considerable accuracy. It turns out to have about 318 times the amount of material making up the earth.

Knowing Jupiter's mass, and how fast it spins, astronomers can calculate the centrifugal force at the equator, and how much it would bulge if its material were distributed uniformly throughout its globe. On this basis, however, it turns out that it should bulge even more than it does, proving, therefore, that the material is not uniformly distributed. Instead, the bulk of the mass must be concentrated at the center core, with lighter kinds of stuff in the outer layers, so light in fact that they must be largely gaseous.

#### Jupiter Gaseous

Moreover, the gaseous character of the outer layers of Jupiter is confirmed by the remarkable changes that occur in its surface features. Most conspicuous of these, when it is viewed through a telescope, are the red and brown belts which cross its surface parallel to the equator. These are continually changing their details, with spots appearing and vanishing. The surface at the equator turns more rapidly than the parts nearer the planet's poles, additional evidence that we are not looking at a solid surface.

Analyzing, by means of a spectroscope, sunlight reflected by Jupiter, we find dark bands at certain wavelengths which have been absorbed by some material in the planet's atmosphere. These have been shown to be due to the gases we know as methane, or "marsh gas," and ammonia. Hydrogen, also, is probably most abundant in the atmosphere, but it causes no bands that can be observed. Nitrogen is the chief element in our atmosphere, but what there has been in that of Jupiter has probably combined with the hydrogen to form ammonia, which contains both these elements. Oxygen, that may once have been present, has likewise probably combined with the hydrogen to form water. At the low temperature prevailing there, because of its great distance

from the sun, this would doubtless have frozen and fallen far out of sight.

#### Structure of Jupiter

According to Dr. Rupert Wildt of Yale University, who first showed the presence of ammonia and methane on Jupiter, the planet's structure is something like this: At the center is a rocky-metallic core, about six times as dense as water and about 34,000 miles in diameter. Over this is a frozen ocean—a layer of ice some 20,000 miles deep. On the outside, some 6,000 miles in thickness, is a layer of frozen ammonia crystals in an atmosphere of hydrogen and methane. There must also be some unfrozen, gaseous ammonia to cause the observed absorption bands.

Possibly, as Dr. Fred Whipple, of Harvard College Observatory, has suggested, there is no sharp transition between the atmosphere and the ice layer. The clouds may become thicker and thicker with depth, finally turning into a layer of ammonia slush, which becomes solid still farther down. A further suggestion is that since there are brown and red compounds of ammonia in combination with potassium and sodium, these may account for the coloration observed in the surface of Jupiter.

#### Time Table for August

Aug.	EST	
5	2:56 p. m.	Moon in last quarter
6	10:00 a. m.	Moon farthest, distance 251,200 miles
11	9:46 a. m.	Moon passes Venus
12	early morning	Meteors of Perseid shower visible
13	11:48 a. m.	New moon
15	3:01 p. m.	Moon passes Saturn
18	11:01 p. m.	Moon passes Mars
19	midnight	Moon nearest, distance 229,800 miles
	10:35 a. m.	Moon in first quarter
21	6:00 a. m.	Mercury farthest east of sun
26	2:00 a. m.	Jupiter opposite sun and nearest earth; distance 371,200,000 miles
27	6:31 a. m.	Moon passes Jupiter
	9:51 a. m.	Full moon

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, July 22, 1950

#### CHEMISTRY

### Mercuric Chloride for Better Watered Farms

➤ MORE water in U. S. farming areas where irrigation means the difference between prosperity and drought—that is the promise of the chemical mercuric chloride and a trick known as "water spreading."

In areas such as California's San Joaquin Valley, irrigation pumping is threatened by lowering water tables. More water is being pumped from wells than is being replaced each year. Yet in the spring as mountain snows melt—or during infrequent cloud bursts—there is so much water that local floods result.

Irrigation engineers are experimenting with "water spreading" to conserve this occasional heavy run-off of water. The idea is to divert it to shallow dike-enclosed reservoirs, where it will stand still long enough to soak into the subsoil.

But when soil is continuously submerged for a few weeks, micro-organisms in the earth multiply, choking the tiny channels through which the water can filter downward.

Mercuric chloride may be the answer. A very small amount of the disinfectant chemical added to water will kill the obstructionist microorganisms, and keep the water percolating into the subsoil storage layers.

Science News Letter, July 22, 1950



New...

### D-C INDICATING AMPLIFIERS stabilized for zero and gain

More than straight amplifiers, these new D-C Indicating Amplifiers are stable, accurate measuring instruments as well. You can use them in almost any measurement of extremely small direct current or voltage.

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## PSYCHIATRY

## Frigidity in Women

► TRUE frigidity in women, one of the most common problems in gynecology, is a neurotic illness due solely to psychologic factors.

Physicians specializing in this branch of medicine which deals with woman's constitution and diseases should therefore be aware of these psychologic factors and prepared to deal with them from the psychiatric viewpoint, Dr. William S. Kroger of Chicago and Dr. S. Charles Freed of San Francisco advise fellow physicians through a report to the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (June 10).

True frigidity, they state, cannot be cured by appealing to the patient's conscious processes. Threats and recriminations are valueless. If the gynecologist has been trained in psychiatry he can use hypnoanalysis to bring to light the unconscious feelings that are at the root of the patient's frigidity.

Gynecologists and obstetricians, however, must know their limitations in the field of

psychiatric treatment lest they do more harm than good, Drs. Kroger and Freed point out.

Among important underlying causes of true frigidity the physicians give the following unconscious feelings and conflicts:

1. Guilt feelings because of infidelity or hostility to the husband because the woman thinks he is unfaithful. Ordinary re-education and discussion are useless in these cases. The patients must be referred to the analytically oriented psychiatrist.
2. Religious or moral attitudes taught in childhood. Though the present generation has had better sex education than its predecessors, sex is still "taboo, dirty and sinful to a large number of frigid women."
3. Arrested emotional development at the level of childhood when the love object is the parent of the opposite sex.
4. Hostility toward all men.
5. Latent homosexuality.
6. Narcissism, or too much self-love.
7. Emotional immaturity.

Science News Letter, July 22, 1950

## AERONAUTICS

## Air Navigation Aid

► AN IMPORTANT forward step in flying safety is a contract recently signed in Washington by the U. S. Civil Aeronautics Administration for 450 ground stations equipped with distance measuring apparatus.

By means of them, a pilot in flight will continuously know his distance from a radio range. The equipment, known as DME for short, will use radar-type radio pulse transmission.

The DME transponders are part of a revolutionary new air navigation system being installed for civil and non-tactical use under a program developed by the Radio Technical Commission for Aeronautics. It is a companion device for the 400 new omnirange stations, 300 of which are now in use. These provide static-free radio beams in all directions for pilots to follow.

The DME equipment, as explained by CAA, is one of the electronic miracles born during the last war. It is a much-improved and modified version of the radar beacons, known as "racons." It operates on very high frequency in the static-free part of the radio spectrum.

In use, aircraft must be fitted with a special radio transmitter and receiver. The transmitter sends out coded pulses of radio energy. The ground-based DME equipment receives these pulses, and then hurls back another set of radio pulses to the plane. The time required for the "round trip" is measured by the receiver in the plane, and translated into miles for the pilot.

Each DME ground station can serve 50 aircraft at the same time. With modifications it could serve more. Its normal range is about 40 miles for a plane at 1,000-foot altitude, and up to 200 miles at very high altitudes.

Under the contract signed, the first DME transponder will be delivered to the CAA for testing late this year. Others will follow, reaching 40 units per month by June, 1951. The contract is with Hazeltine Electronics Corporation, Little Neck, L.I.

Science News Letter, July 22, 1950

## NUTRITION

## Vitamin Diet: Codfish Livers and Cod Liver Oil

► IN the vitamin age of the future, young poultry and livestock—perhaps even children—will be given codfish livers as well as cod liver oil.

A new method of extracting the important oil from fish livers, oil-rich in vitamins A and D, has led to the discovery by Canadian fisheries scientists that the liver residue carries as much of the B-complex vitamin group as beef liver and pork liver.

The vitamin B group is drawing increasing attention from nutritional experts. It includes the vital substance called APF, or animal protein factor, as well as food elements which combat pernicious anaemia. More and more poultry raisers in par-

ticular are including dried fish meal in their chicks' diet.

As a source of these vitamins, codfish liver residues could revitalize the ailing cod liver oil industry on this side of the Atlantic, the Fisheries Research Board of Canada indicates in its annual report.

Dr. F. A. Vandenheuvel, chemist at the Canadian government's experiment station in Halifax, Nova Scotia, achieved a new and much more efficient way of separating the oil from cod livers last year. This spring the method, employing centrifuges and a chemical reaction, was tried out for the first time on a commercial scale by a cod liver oil producer.

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## AERONAUTICS

## Supersonic Plane Pilots Need Electric Eyes

► PILOTS of supersonic planes will need electric eyes to avert collisions in midair. Air fighting at supersonic speeds will be "very difficult." Figures on the speeds of these planes and the speed of human vision and reaction time show this.

The comparative figures were reported by Col. Victor Byrnes, chief of the department of ophthalmology at the U. S. Air Force School of Aviation Medicine, Randolph Field, Tex., at the Pan-American Conference on Prevention of Blindness in Miami Beach, Fla.

If two aircraft came out of the clouds 8,000 feet apart coming toward each other, they would collide before either pilot could do anything about it," he declared.

"If they came out of the clouds head-on at a distance 500 feet apart, they would collide without either pilot having seen the other."

With flying speeds in excess of the speed of sound now an accomplished fact, engineers are publicly predicting speeds of 1,800 miles per hour for the not too distant future, he pointed out.

"At a speed of 2,000 miles per hour the pilot could not turn a circle smaller than 18 miles in diameter, and unless wearing a good protective suit or assuming a position other than upright, he would be blacked out all the way around the turn," Col. Byrnes stated. "Aerial combat under such conditions would be very difficult."

At a speed of 1,800 miles per hour, a pilot travels about a mile every two seconds. It takes about four-tenths of a second for the image of an on-coming plane to be relayed to his brain, during which time his plane has travelled nearly one-fifth of a mile. But during this time and distance he has not yet recognized the image, he has only seen it. Recognition takes another second, on the average, during which the plane travels another 2,640 feet.

Supersonic craft, Col. Byrnes said, are now being fitted with electronic devices which can react faster than man.

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## MEDICINE

# Man-Made ACTH Soon

► THE day when ACTH, powerful anti-arthritis hormone of the pituitary gland, can be synthesized may be closer than anyone now realizes.

Dr. C. H. Li, University of California researcher who first isolated the hormone before its value in arthritis was known, now takes this optimistic view.

"I have a feeling now that we will be able to synthesize it," he said.

The "feeling," he explained, is like the feeling he has had before when he was working on the isolation of pituitary gland hormones. After a period of discouragement when the work seemed almost to stand still, he got a feeling that finally he was on the right road to his goal. Success in the isolation soon followed.

Now he has reported to the JOURNAL OF THE AMERICAN CHEMICAL SOCIETY (July) that he has found a way to triple the potency of ACTH. This, in effect, triples the supply, since the same quantity of the more potent material will do three times the work of the former material.

## AGRICULTURE

# Weeds Fight 2,4-D

► WEEDS are fighting back. Just as super-strains of the pesky housefly have been found which can laugh at once-deadly DDT, now a grassy weed in Louisiana sugar cane is reported developing resistance against one of man's newest, most potent weed-killers—2,4-D.

The discovery was made by Leo Hebert, plant scientist at the Department of Agriculture's sugar crops laboratory at Houma, La. It was revealed in a regular work progress report to Washington.

The weed with growing immunity to 2,4-D is called Johnson grass. When sugar cane fields were first treated with the chemical, nearly all of the Johnson grass was killed. From the few surviving plants, however, the government sugar scientist saved seeds.

This year his suspicions were confirmed. Second-generation seedlings, offspring of the hardy plants which survived the first dose of 2,4-D, were found to be twice as resistant to the weedkiller as plants of the previous generation.

Johnson grass is really not a weed. It was introduced into the South as a forage crop for livestock more than a century ago. Since then it has spread widely, however. Growing profusely in sugar cane and cotton fields, it has become a top-ranking plant pest. The government considers it the No. 1 enemy of sugar cane today.

The plant specialists found that a relatively low dose of 2,4-D, applied early in

The method consists simply in boiling ACTH in an acid solution. The potency of a powerful peptide fraction of ACTH can also be tripled by the same acid boiling treatment. This peptide fraction of ACTH has been given to four arthritis patients with the same beneficial results as are obtained by ACTH itself.

FSH, another pituitary gland hormone, can now also be broken down into peptide fractions, Dr. Li reports. This hormone holds the key to fertility in both male and female. It is known as the follicle stimulating hormone, or FSH, because in the female it stimulates the growth of the ovarian follicles, making ovulation possible. In the male it may stimulate the tubules which produce sperm for fertilizing the ova.

Obtaining biologically active fractions of FSH may lead to synthesis of this pituitary hormone also. At present, the sole supply is from slaughtered livestock. Amounts available of the pure hormone are so small that adequate animal experimentation has not even been possible.

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the spring before the weed had pushed through the soil, reduced the emergence of Johnson grass seedlings by as much as 95%. Other pests, such as alligator weed and tie vine, were equally well controlled.

But when similar treatments were given to second-generation Johnson grass, twice as many seedlings pushed up through the soil as the year before. They were apparently resistant to the chemical.

Department of Agriculture officials say the study of Johnson grass will be continued to see if the resistance grows. They seemed to think it would.

It now appears that chemical weed control is another field in which science must always look for something new, just as it has had to do in the fight on house fly strains showing resistance to DDT, said the glum official announcement of the Johnson grass discovery.

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## PHYSICS

# Artificial Meteors from Bazooka-Like Experiment

► ARTIFICIAL meteors have been created and photographed in the laboratory at the Carnegie Institute of Technology, Pittsburgh. The metal jets formed have velocities comparable to real meteors (which come into the earth at about 11 miles per second speeds), Dr. E. M. Pugh reported

to the American Physical Society in Washington.

As the slugs rip through the air, the head end becomes incandescent from friction, and the metal vapor trails coming from the tip are clearly seen in the photographs.

A refinement of the war-time bazooka charge was the source of the laboratory shooting stars. To make them, an explosive is hollowed out making a conical recess. Fitted tightly into this is an accurately machined metal cone. Accuracy here is essential to get a clean jet that can be photographed, Dr. Pugh emphasized. Other attempts to photograph the jets had been prevented by a shroud of misdirected particles surrounding the main jet which were due to inaccurate alignment.

Super-high-speed camera techniques are a must for such photographs, and some of these details were revealed by Dr. Pugh's collaborators R. Heine-Geldern, Simon Foner, and E. C. Mutschler. The light source is a wire exploding under an overload of electrical current, giving single flashes of 500,000,000 candle power. An ordinary mechanical shutter, good to a thousandth of a second, is far too slow to stop meteors in their tracks. The electrical Kerr cell technique, with operating voltages of 25 kilovolts, was found necessary to give the shutter speed of one millionth second.

Besides meteors, the collaborators, who were working under a contract with the office of the Army's Chief of Ordnance, studied such things as the way an explosive explodes, what happens when two explosives go off simultaneously near each other, and how shock waves travel through metals.

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## PHYSICS

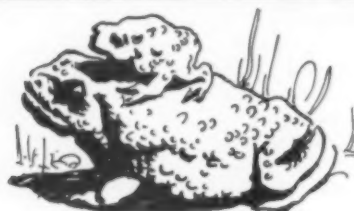
# Color Photos Made Quickly

► COLOR photographs, better for war-time camouflage detection, are made in quick time and as easily as black-and-white prints by a process developed in Dayton, Ohio, at Wright-Patterson Air Force Base.

With the new method the time required for processing color film is reduced from 90 to 20 minutes, and the printing time from 90 to 15 minutes. The time saving is of particular importance from a military standpoint.

Basis of the new method is a pre-hardener which permits the processing to be done at 80 degrees Fahrenheit instead of the 68 to 70 degrees used ordinarily. The hardener prevents the emulsion from becoming too soft at the higher temperature. All ordinary standard chemicals previously used in Air Force color processing kits have been altered to meet the new requirements.

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Toads and Frogs

► **BOOKS** give various clues whereby the layman can distinguish toads from frogs. In general toads are predominantly land-lubbers with bumpy dry skin and broad plump bodies. Frogs are generally aquatic with smooth moist skin and more streamlined bodies.

But there are so many exceptions in each particular that the distinction often disappears. Both frogs and toads are amphibians, a class they share with newts and salamanders.

The name amphibian comes from a Greek word meaning living a double life. Amphibians are equally at home on land or in the water. This versatile ability to thrive in either element is nowhere more startlingly demonstrated than in the tadpole stage of frogs and toads.

When a frog egg hatches, the newborn offspring is a strange-looking little creature that seems to be a tiny fish. It swims like a fish and it has gills that enable it to breathe like a fish. But in the course of a few weeks the tail grows longer and hind legs begin to develop. Eventually the two forelimbs, which have been forming unseen beneath the skin, are pushed out through the gill slits.

By now it has ceased to be an exclusively aquatic creature and is well on its way to fulfill its destiny as an adult frog or toad. It develops lungs. The tail, which at this stage is less a swimming instrument than a food reservoir to tide the youngster over the transition period, gets slowly smaller and smaller until it disappears altogether.

Since most waters abound with predatory enemies which spend the better part of their time cruising about looking for a bite of lunch, the life expectancy of tadpoles is not very high. To compensate for this, nature produces tadpoles in great numbers so that enough will survive into maturity to insure the perpetuation of the species.

Some frogs skip the tadpole stage entirely. There is one African frog which carries its fertilized eggs in its mouth, not eating until the baby frogs are hatched out. Some Latin American species carry the tadpoles

on their backs, affixed by specialized sucking mouths.

One of the most remarkable is the Surinam toad of Brazil and the Guianas. Its back looks as though it had caught a shotgun blast, being pockmarked with innumerable hollow cavities. By dint of the

most strenuous cooperation of the male, the fertilized eggs are forced into the pockets. In time the eggs hatch out, and the youngsters play midwife to their own births, clambering into life on their own power as they squirm out of their mother's back.

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#### MEDICINE

## Report on Antihistamines

► **LATEST** medical report on the antihistamines in the treatment of the common cold states that there is "no indication" that they "have any important effect on the duration or severity of these infections of the upper respiratory tract."

The report is from Drs. Donald W. Cowan and Harold S. Diehl of the University of Minnesota Students' Health Service.

They started their controlled experiment in the fall of 1948. They had intended running it for two years, but because antihistamine drugs were released for over-the-counter sale in the fall of 1949, they stopped the study then. The reason was that they thought there would be some difficulty in keeping the control group, which did not get the antihistaminics, strictly controlled.

The study was made on 367 University of Minnesota students who volunteered for the study because they were especially susceptible to colds and colds constituted a real problem to them. These 367 students treated 980 colds between December, 1948 and April, 1949.

The antihistaminic drugs used were thephorin and pyribenzamine. Ascorbic acid, or vitamin C, was also tested because an earlier experiment by Drs. Cowan and Diehl suggested a possible though slight

effect of this chemical in preventing colds.

The drugs under trial and a placebo which looked and tasted the same but had none of the on-trial drugs in it were given to the students in rotation as they enrolled for the study. They were also given directions to start taking the medicine at the first symptoms of a cold and to take it every four hours thereafter till the cold was "cured" or till their supply of 10 doses was used up.

With each of the medicines and with the placebo the colds lasted between five and six days.

Many enthusiastic reports were received from students in the experiment. Some of the "most glowing testimonials came from members of the control group," the doctors state.

A year after the experiment a student who had graduated made a special trip to Minneapolis from the northern part of Minnesota to get some of the medicine he had taken. When the doctors checked the records, they found he had been in the group getting the placebo, or mock medicine.

Details of the study are reported to the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (June 3).

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#### PHYSICS

## Thorium Usefulness Proved

► **FURTHER** proof of the usefulness of thorium in the production of A-bombs was revealed at the meeting of the American Physical Society in Mexico City.

Fission of thorium atoms, like fission of uranium atoms, produces both light and heavy elements, Dr. A. Turkevich and J. Niday of the University of Chicago and the Argonne National Laboratory in Chicago told the meeting.

Also, like uranium, thorium fission is similar to slow neutron fission in being highly asymmetric. While thorium, by itself cannot sustain a chain reaction, like the bread crumbs in a meat loaf, if combined with uranium it serves to stretch out the uranium and make it go farther.

The two Chicago scientists identified 19 different light and heavy elements that resulted when thorium was split in the laboratory.

Thorium is much more plentiful than uranium and so should permit the manufacture of many more A-bombs.

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#### ENTOMOLOGY

## Starlings Feast On Insect Pests

► **DON'T** berate the starling, famed mimic of the bird world. Though it often is branded a nuisance, a bulletin of the Smithsonian Institution reported that the starling is a major enemy of an even greater nuisance—insects which are gnawing U.S. crops this year. The starling devours vast numbers of Japanese beetles, potato beetles, caterpillars and weevils.

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# Books of the Week

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**AIRCRAFT ENGINE MAINTENANCE AND SERVICE**—Rollen H. Drake—*Macmillan*, 237 p., illus., \$5.00. Presents the fundamentals of aircraft maintenance in non-technical language. For laymen, students, teachers and certified aircraft engine mechanics. Profusely illustrated.

**ANIMALS AND THEIR BEHAVIOUR**—Maurice Burton—*Edward Arnold* (Longmans, Green), 144 p., illus., 60 cents. The behavior of some of the more common animals is discussed.

**THE CAVE BOOK**—Charles E. Hendrix—*Earth Science*, 68 p., illus., paper, \$1.00. The science of caves (speleology), explained for the general reader.

**CONTRIBUTIONS TO THE FLORA OF SOUTH AMERICA: Studies on Andean Compositae—I: Studies in South American Plants—II—Jose Cuatrecasas**—*Chicago Natural History Museum*, Fieldiana: Botany, Vol. 27, No. 1, 113 p., illus., paper, \$1.75. New species of *Senecioneae* from Colombia, Venezuela and Ecuador, collected chiefly by the author, are described.

**THE EARTH FOR THE LAYMAN**—Mark White Pangborn—*American Geological Institute*, Report No. 2, 50 p., paper, \$1.00. Titles of 625 books covering the gamut of non-technical reading from novels with a geological background or the identification of common fossils, to instructions on how to identify minerals and grind the facets on a gemstone.

**HUMANISM IN AN AGE OF SCIENCE**—John Farquhar Fulton—*Schuman*, 26 p., paper, 75 cents. A Ludwig Mond Lecture delivered at the Manchester School of Medicine on October 6, 1949, dealing with the interrelations between science and literature.

**THE JAPAN SCIENCE REVIEW**, Engineering Sciences, Vol. 1, No. 1—*Engineering Society of Japan—Association for Science Documents Information*, 212 p., paper, \$5.00 per year, \$1.50 single copy. A quarterly bringing together representative Japanese scientific papers translated into English.

**POCKET GUIDE TO ALASKA TREES**—Raymond F. Taylor and Elbert L. Little, Jr.—*Gov't. Printing Office*, U. S. Dept. of Ag., Agriculture Handbook No. 5, 63 p., illus., paper, 25 cents. A revision of the booklet first published in 1929 in response to the need of a nontechnical description of Alaska's tree species.

**REQUIREMENTS FOR OFF-STREET AUTOMOBILE PARKING FACILITIES IN ZONING AND OTHER LOCAL ORDINANCES**—David R. Levin—*Highway Research Board*, Bulletin No. 24, 108 p., illus., paper, \$3.00. This bulletin consists of an analysis, in two parts, of the requirements for provision of parking facilities in connection with various property uses, as contained in 155 local ordinances.

**REVIEW OF THE ESTONIAN OIL SHALE INDUSTRY, WITH A BRIEF ACCOUNT OF OIL SHALE DEVELOPMENT IN THE UNITED STATES**—Peter O. Krumin—*Engineering Experiment Station*, Circ. No. 50, 125 p., illus., paper, \$1.00. (See SNL July 15, 1950, p. 45).

**THE STATE FAIR BLUE RIBBON COOK BOOK**—Lois J. Hurley and Isabelle J. Groetzinger—*Fell*, 256 p., illus., \$2.95. A history of State Fairs as well as prize recipes is included.

**STELLAR EVOLUTION: An Exploration from the Observatory**—Otto Struve—*Princeton University Press*, 266 p., illus., \$4.00. An historical account of research on the origin and the evolution of stars.

**THEORETICAL INVESTIGATIONS ON THE EFFICIENCY AND THE CONDITIONS FOR THE REALIZATION OF JET ENGINES**—Maurice Roy—*National Advisory Committee for Aeronautics*, Technical Memorandum 1259, 238 p., paper, free upon request to publisher, 1724 F St., N.W., Washington, D.C. Translation from the French.

**TRANSACTIONS OF LEGAL CONFERENCE—Industrial Hygiene Foundation of America, Inc.**, Bulletin No. 12, 50 p., paper, 75 cents. A report summarizing legislative developments in workmen's compensation, state industrial hygiene codes, air-pollution regulations, and trends in health and sickness disability benefits.

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## EDUCATION

### Educational Steps In Point Four Program

➤ THE Point Four program must include an educational effort as bold, new and imaginative as the technical assistance effort, a commission of the National Education Association warned in a report issued in Washington.

New and strange elements will be introduced into the cultures of other nations, the experts observed. Not only the ways but also the ends and values of life will be affected.

"The clear purpose of the program," the Educational Policies Commission report says, "should be to assist the people of each participating country to improve their condition." We must avoid even the suggestion of exploitation of the weak, of "dollar diplomacy," of "cultural imperialism." We must avoid imposing through economic pressure a way of life or a political philosophy.

It was recommended that the educational program embrace non-school as well as school agencies. All Americans participating should receive special preparation for their duties. The "rich ethnic resources" of America should be fully utilized, the report advised, recommending that talent present in our Negro citizens be sought out in working with technically undeveloped peoples, the majority of whom belong to the colored races.

Specialists of other countries should be trained in the United States, and selected

young men and women should study our development of industrial civilization.

The American people must be prepared for a long and sustained effort, the educators warned.

The colonial peoples are rising, the report said in arguing for the Four Point program. Approximately two-thirds of the people of the earth are caught in a vicious circle of ignorance, poverty, disease and hunger. Nevertheless, a life of economic security and well-being is technically possible for all men. War threatens the very survival of civilization, and the whole world is threatened by a powerful and ruthless totalitarian movement, Soviet Communism. America occupies a position of immense and sobering responsibility, since in terms of industrial strength and military potential ours is the most powerful state in the world.

Science News Letter, July 22, 1950

Optical systems used in modern street-lighting systems not only secure more light from the lamp, but also direct the light at an angle to get greater pavement brightness.

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☼ **SUN GLASS LENS** cuts out reflected glare, heat and sunburn rays. It is a "sandwich" affair, with a center layer of white prescription-ground spectacle glass, an inner layer of glare-absorbing material and an outer layer to absorb both infra-red and ultraviolet rays.

Science News Letter, July 22, 1950

☼ **TOUGH PLASTIC** material, developed to bridge the gap between soft rubber and hard rubber, is suitable for low-cost gears to replace metal gears in devices ranging from lathes to washing machines. The plastic gears can be accurately molded and are resistant to chemicals and abrasion.

Science News Letter, July 22, 1950

☼ **MANICURE LIGHT** is a broad U-shaped device which rests on one side with the other above. The lower arm has grooves to hold the fingers, while the upper one contains a covered electric bulb to concentrate light directly down on the finger nails.

Science News Letter, July 22, 1950

☼ **DRESSMAKING AID** is a plastic measuring and marking device, a one-hand tool as shown in the picture. Marks are made with tailor's chalk to locate exact position



for tucks, buttons, buttonholes, hooks and eyes and other details in sewing and knitting.

Science News Letter, July 22, 1950

☼ **EGG-INSPECTION** light utilizes ultraviolet rays to detect fluorescence in the albumen due to infection of certain organisms. This fluorescence can also be detected

in shell eggs, and the light can be employed to show whether or not eggs have been washed.

Science News Letter, July 22, 1950

☼ **WHISK BROOM** has its bristles on a base movable within the handle so that the brush itself can be varied in length from near zero to four inches to obtain firmness for serving different purposes. Bakelite styrene plastic forms the bristles and also the five-inch handle-case.

Science News Letter, July 22, 1950

☼ **EASY-WEIGH SCALE** is carried in one hand and merely hooked onto the handle of a milk pail or other container. The weight can be seen at a glance on a horizontal dial at the top. Made of cadmium-plated steel and aluminum, the device is less than three pounds in weight.

Science News Letter, July 22, 1950

☼ **WALL BRACKET** for a telephone directory has a shelf compartment big enough to hold the largest directory and a top designed with a groove for pencils and a space for a pad. Finished in various colors, it is easily attached to the wall with two screws.

Science News Letter, July 22, 1950

## Do You Know?

Chicks can be raised successfully on all-vegetable rations if the diet is supplemented with vitamin B<sub>12</sub>.

Experimental work in America with the rubber-producing *guayule* is continuing with a fair degree of success.

"Street couplet" is a term now being used where two parallel streets, one block apart, are used for one-way traffic in opposite directions.

"Traveling creameries" are in use in Ireland; they are in trucks which visit out-lying farms, run the milk through separators, and buy the cream.

The U. S. Navy got its first submarine in 1900; it was the 53-ton, 74-foot Holland, a tiny craft in comparison with present 1,500-ton, 300-foot submersibles.

An experiment, using DDT, to make Cuba's Isle of Pines a mosquito-less resort is under way; this malarial island was the inspiration for Stevenson's "Treasure Island."

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